

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK



VII SEMESTER

1903703 -STRUCTURAL DYNAMICS

Regulation – 2019

Academic Year 2025-2026

Prepared by

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DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

SUBJECT : 1903703 / STRUCTURAL DYNAMICS

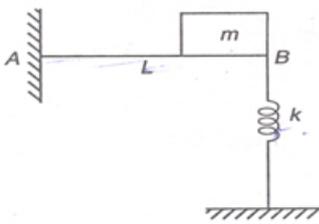
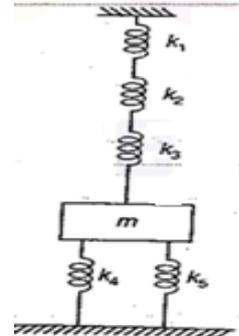
SEM / YEAR: VII/IV

UNIT I – SINGLE DEGREE OF FREEDOM SYSTEM			
Definition of degree of freedom – Degree of freedom – idealization of structure as single degree of freedom system – Formulation of Equations of motion of SDOF system - D'Alembert's principles – effect of damping – free and forced vibration of damped and undamped structures – Response to harmonic and periodic forces.			
PART - A			
Q.No	Questions	BT Level	Competence
1.	What is mean by theory of vibration?	BT-1	Remember
2.	Define logarithmic decrement method.	BT-1	Remember
3.	Name critical damping.	BT-1	Remember
4.	List out the methods to derive the equation of motion	BT-1	Remember
5.	What do you understand by deterministic analysis?	BT-1	Remember
6.	What is meant by frequency response curve for damped system?	BT-1	Remember
7.	Outline D-Alembert's principle of dynamic equilibrium.	BT-2	Understand
8.	Classify the types of vibration.	BT-2	Understand
9.	List the types of Damping.	BT-2	Understand
10.	Explain frequency ratio.	BT-2	Understand
11.	Distinguish between static and dynamic degrees of freedom?	BT-2	Understand
12.	Write down the equation of motion of a structure in SDOF system for free and forced vibrations.	BT-3	Application
13.	Demonstrate about dynamic load factor.	BT-3	Application
14.	Differentiate over damped and under damped system.	BT-3	Application
15.	Identify the consequences of vibration.	BT-3	Application
16.	Examine Degrees of freedom and list the types.	BT-4	Analyse
17.	Examine the mathematical equation for equivalent stiffness for springs in parallel and springs in series.	BT-4	Analyse
18.	Examine resonance and natural frequency.	BT-4	Analyse
19.	Tell about free vibration response and transient response.	BT-4	Analyse
20.	Write down the fourier series for periodic loading.	BT-3	Application
21.	Compare static and dynamic loading.	BT-3	Application
22.	Interpret Frequency and Time period.	BT-2	Understand
23.	Write short note on amplitude.	BT-3	Application
24.	Formulate simple Harmonic motion.	BT-3	Application
25.	Write the mathematical model of damped SDOF system.	BT-3	Application

PART - B

Q.No	Questions	BT Level	Competence
1.	A mass 1kg is suspended by a spring having a stiffness of 600 N/m. The mass is displaced downward from its equilibrium position by a distance of 0.01m. find (a) Equation of motion of the system (b) Natural frequency of the system (c) The response of the system as a function of time. (d) Total energy of the system.	BT-4	Analyse
2.	A harmonic motion has a maximum velocity of 6m/s and it has a frequency of 12cps. Determine its amplitude, its period and its maximum acceleration.	BT-3	Application
3.	A damper offers resistance 0.08 N at a constant velocity 0.06m/s. The damper is used with a spring of stiffness equal to 12 N/m. Determine the damping ratio and frequency of the system when the mass of the system is 0.3kg.	BT-2	Understand
4.	A single degree of freedom system having a mass of 2.5m is set into motion with a viscous damping and allowed to oscillate freely. The frequency of oscillation is found to be 20 Hz, and measure of the amplitude of vibration shows two successive amplitude to be 6mm and 5.5mm. Estimate the viscous damping co-efficient.	BT-5	Evaluate
5.	A vibrating system consists of a mass of 5kg, spring of stiffness 120 N/m and a damper with a damping co-efficient of 5 N-s/m. Examine Damping factor, Natural frequency of the system, Logarithmic decrement, The ratio of two successive amplitude, The number of cycles after which the initial amplitude reduces to 25%	BT-4	Analyse
6.	A vibrating system consists of a mass of 20kg a spring of stiffness 20 kN/m and a damper. The damping provided is only 30% of the critical value determine: (a) The damping factor (b) The Critical damping coefficient (c) The natural frequency of damped vibrations (d) The logarithmic decrement and (e) The ratio of the consecutive amplitudes.	BT-4	Analyse
7.	Derive the equation of motion for SDOF system free vibration and find the solution for undamped system.	BT-3	Application
8.	Solve the equation of motion of SDOF for free vibration to find out the natural frequency and angular frequency.	BT-3	Application
9.	Define and discuss the following: (i) critical damping (ii) Coulomb damping (iii) Damped circular frequency	BT-1	Remember
10.	A mass of 1 kg is suspended by a spring having a stiffness of 600N/m. The mass is displaced downward from its equilibrium position by a distance of 0.01m. Find	BT-2	Understand

	(a) Equation of motion of the system (b) Natural frequency of the system (c) The response of the system as a function of time (d) Total energy of the system		
11.	A cantilever beam 3m long supports a mass of 500kg at its upper end. Find the natural period and natural frequency. $E=2.1 \times 10^6 \text{ kg/cm}^2$ and $I=1300 \text{ cm}^4$.	BT-4	Analyse
12.	A vertical cable 3m long has a cross sectional area of 4 cm^2 supports a weight of 50 kN. What will be the natural period and natural frequency of the system? $E=2.1 \times 10^6 \text{ kg/cm}^2$.	BT-4	Analyse
13.	A machine mounted on springs and fitted with a dashpot has a mass of 100kg. There are four springs, each of stiffness 25 kN/m. The amplitude of vibrations reduces from 40mm to 10mm in three complete oscillations. Assuming that the damping force varies as the velocity determine: (i) The resistance of dashpot at unit velocity (ii) The ratio of frequencies of damped and undamped vibrations and (iii) The periodic time of damped vibrations.	BT-5	Evaluate
14.	A body of mass of 50kg is suspended by an elastic structure of stiffness 10 kN/m. the motion of the body is controlled by a dashpot such that the amplitude of vibration decreases to one-tenth of its original value after two complete vibrations. Determine: (i) The damping ratio (ii) The damping force at 1m/s and (iii) The natural frequency of vibration.	BT-1	Remember
15.	Solve the equation of motion of SDOF for vibration to find out the natural frequency and angular frequency.	BT-3	Application
16.	A machine foundation weights 60 kN. The spring constant is 11000 kN/m and dash constant (C) = 200 kN s/m . Explain whether system is over damped, under damped or critical damped. Determine logarithmic decrement, ratio of two successive amplitude. If the initial displacement and initial velocity is zero displacement at $t=0.1 \text{ s}$	BT-4	Analyse
17.	Derive the equation of motion for SDOF system free vibration and find the solution for damped system.	BT-3	Application
PART-C			
Q.No	Questions	BT Level	Competence
1.	A cantilever beam AB of length L is attached to a spring k and a mass M as shown in figure 2.12. (a) Form the equation of motion; and (b) Find an expression for the frequency of motion.	BT-3	Application

			
2.	<p>Consider the system shown in figure if $k_1 = 2000\text{N/m}$, $k_2 = 1500\text{N/m}$, $k_3 = 3000\text{N/m}$, $k_4 = k_5 = 500\text{N/m}$, find the mass if the system has a natural frequency of 10 Hz.</p>	BT-4	Analyze
			
3.	<p>In a single degree damped vibrating system, the suspended mass of 4kg makes 24 oscillations in 20 seconds. The amplitude decreases to 0.3 of the initial value after 4 oscillations. Find the stiffness of the spring, the logarithmic decrement the damping coefficient.</p>	BT-5	Evaluate
4.	<p>A mass of 12kg is kept on two slabs of isolators placed one over the other. One of the isolator is of rubber having a stiffness of 2.5kN/m and damping coefficient of 95 N-sec/m while the other isolator is of felt with stiffness of 10 kN/m and damping coefficient of 280N-sec/m. if the system is set in motion in vertical direction, determine the damped and undamped natural frequencies of the system.</p>	BT-2	Understand
5.	<p>A SDOF system having mass of 2.5kg is to set into motion with a viscous damping and allowed to oscillate freely. The frequency of oscillation is found to 20Hz and measure of amplitude of vibration shown two successive amplitude to be 6mm and 5.5mm. Estimate viscous damping coefficient.</p>	BT-4	Analyze

UNIT II - MULTIPLE DEGREE OF FREEDOM SYSTEM

Formulation of equations of motion of multi degree of freedom (MDOF) system - Eigen values and Eigen vectors – Response to free and forced vibrations - damped and undamped MDOF system – Modal superposition methods.

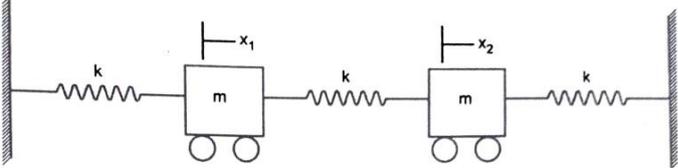
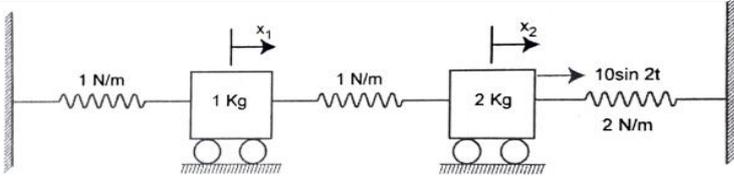
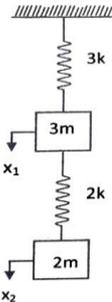
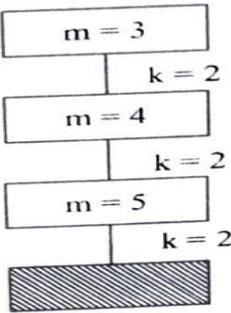
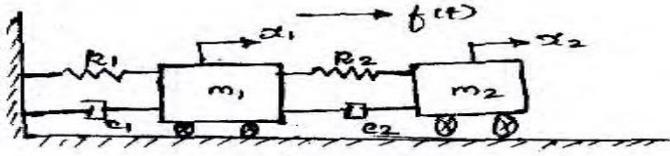
PART - A

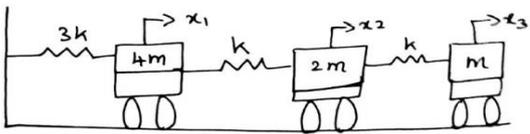
Q.No	Questions	BT Level	Competence
1.	What is fundamental frequency and fundamental mode shape?	BT-1	Remember
2.	List out the assumptions made in the concept of shear building.	BT-1	Remember
3.	Compare orthogonality and normality principles.	BT-3	Application
4.	Formulate the equation of motion for a damped two degrees of freedom system.	BT-3	Application
5.	Define Eigen vectors and Eigen values.	BT-1	Remember
6.	Create the equation of motion for an undamped two degrees of freedom system.	BT-1	Remember
7.	What is meant by coupled and decoupling of equation?	BT-1	Remember
8.	Explain modal super position method.	BT-1	Remember
9.	How frequency is affected in the free vibration of a shear frame?	BT-1	Remember
10.	Define Dunkerley's method.	BT-1	Remember
11.	Identify resonant frequency.	BT-3	Application
12.	Examine impulsive force?	BT-3	Application
13.	Simplify mode shape?	BT-2	Understand
14.	Analyze transitional ground motion?	BT-2	Understand
15.	Enumerate dynamic equilibrium?	BT-3	Application
16.	Select a note on free vibration analysis.	BT-3	Application
17.	Show the equation of motion for Multi-degree of freedom systems	BT-2	Understand
18.	Outline Rayleigh's method.	BT-2	Understand
19.	Illustrate model analysis?	BT-2	Understand
20.	Explain Static Condensation approach.	BT-2	Understand
21.	Illustrate normal modes of vibration?	BT-3	Application
22.	Illustrate the assumptions made in shear building idealization?	BT-3	Application
23.	What is mass matrix?	BT-1	Remember
24.	What is stiffness matrix?	BT-1	Remember
25.	Explain Damped MDOF system.	BT-2	Understand

PART - B

Q.No	Questions	BT Level	Competence
1.	Determine the natural frequency and mode shape of given MDOF system. $EI=4.5 \times 10^6 \text{ N-m}^2$ for all columns. $m_1= 5000\text{kg}$, $m_2= 4000\text{kg}$ and $m_3= 3000\text{kg}$ and the height of each story is 3m.	BT-3	Application
2.	Determine the natural frequency and draw the mode shape for the shear building.	BT-3	Application

3.	Derive the equation of motion of a two degree of freedom system for free vibration.	BT-4	Analyse
4.	Analyze the natural frequency and mode of the system.	BT-4	Analyse
5.	Solve the natural frequency and mode of vibration of the system	BT-3	Application
6.	Determine the natural frequency and mode shapes of the following: The storey masses are $m_1 = 1360\text{kg}$, $m_2 = 660\text{kg}$, $h_1 = 3\text{m}$ and $h_2 = 2.5\text{m}$ moment of inertia is $2I$. take $I = 5 \times 10^5 \text{mm}^4$ and $E = 2.5 \times 10^4 \text{N/mm}^2$.	BT-5	Evaluate
7.	Determine the natural frequency and mode shapes of the following: The storey masses are $M_1 = 2$, $M_2 = 1.5$, $M_3 = 1$ and storey stiffness are $k_1 = 900 \text{ N/m}$ $k_2 = 600 \text{ N/m}$ $k_3 = 300 \text{ N/m}$.	BT-4	Analyse
8.	Define the natural frequencies and mode of vibration of the given System.	BT-4	Analyse
9.	Obtaining the natural frequency and the mode shape for a single bay two storey shear frame with combined stiffness of ground and first floor columns as $k = 2000 \text{ kN/m}$ respectively. Mass of each floor is 2000 kg .	BT-3	Application
10.	Show the expression for the free vibration of a damped two degree of freedom system.	BT-2	Understand
11.	Explain the concept of shear building and modal superposition method.	BT-2	Understand
12.	A three storey building has seismic weights of 200 kN , 300 kN and 420 kN at I, II and III store's respectively; The corresponding stiffness's are 20000 kN/m , 25000 kN/m and 30000 kN/m . (i) Examine the model frequencies. (ii) Sketch the mode shapes	BT-4	Analyse

13.	Determine the natural frequencies and modes of the system shown in figure.	BT-3	Application
			
14.	State and prove the orthogonality property of mode shapes.	BT-2	Understanding
15.	Consider the two degree of freedom systems shown in figure. Determine the steady state of response of the system.	BT-4	Analyse
			
16.	Obtain the frequencies and mode shapes for the system shown in figure. Taking $k=10\text{kN/m}$ and $m=1\text{kg}$.	BT-3	Application
			
17.	Determine the natural frequencies and mode shapes of the building shown below.	BT-4	Analyse
			
PART - C			
Q.No	Questions	BT Level	Competence
1.	Show the differential equation of motion in matrix form for the two degree of freedom system with damping as shown in Fig.	BT-2	Understand
			
2.	Obtain the three natural frequencies and the corresponding mode shapes for the three degree of freedom.	BT-5	Evaluate

			
3.	<p>A 200 kg machine is placed at the end of 1.8 m long steel ($E = 210 \times 10^9 \text{ N/m}^2$) cantilever beam. The machine is observed to vibrate with a natural frequency of 21HZ. What is the moment of inertia of the beam's cross section about its neutral axis?</p>	BT-2	Understand
4.	<p>A cantilever bar is to be modelled by a massless uniform bar to which two lumped masses are attached representing the mass of original system as $k=2AE/L$ and $m=fAL$. Determine natural frequency and normal mode.</p>	BT-3	Application
5.	<p>Explain different methods of vibration analysis?</p>	BT-4	Analyse

PART –B**UNIT III – INTRODUCTION TO EARTHQUAKE ENGINEERING**

Elements of Engineering Seismology – Definitions, introduction Seismic hazard, Earthquake phenomenon – Seismotectonics - Seismic Instrumentation- Characteristic of strong earthquake motion – Estimation of earthquake parameters.

PART - A

Q.No	Questions	BT Level	Competence
1.	Identify the reasons for the occurrence of faults.	BT-3	Application
2.	Explain modified mercalli intensity scale.	BT-2	Understand
3.	Define focus and epicenter.	BT-1	Remember
4.	Differentiate between P-waves and S-waves.	BT-2	Understand
5.	Distinguish between Epicenter and Hypocenter.	BT-2	Understand
6.	Distinguish between seismograph and seismogram.	BT-2	Understand
7.	Identify the causes of Earthquake.	BT-3	Application
8.	What is meant by hypocenter?	BT-1	Remember
9.	Define focal depth and Epicentral distance.	BT-1	Remember
10.	Compare: magnitude and intensity of an earthquake.	BT-2	Understand
11.	Discuss the classification of seismic zones in India.	BT-2	Understand
12.	Classify the types of earthquake.	BT-2	Understand
13.	List out some disastrous earthquakes occurred in past history in India.	BT-1	Remember
14.	Define fault and list its types.	BT-1	Remember
15.	Identify the factors influencing ground motion.	BT-3	Application
16.	How will you develop an Isoseismal map?	BT-3	Application
17.	Summarize the characteristics of earthquake.	BT-2	Understand
18.	How will you evaluate strong ground motion?	BT-3	Application
19.	How will you assess the types of seismic waves?	BT-3	Application
20.	Define Normal fault.	BT-1	Remember
21.	Define Seismology and Earthquake	BT-1	Remember
22.	What is meant by Richter scale?	BT-1	Remember
23.	What are the commonly used intensity scales?	BT-1	Remember
24.	How the earthquakes are classified?	BT-2	Understand
25.	What are the factors influences the ground motion?	BT-1	Remember

PART-B

Q.No	Questions	BT Level	Competence
1.	Find the natural causes of earthquake and explain it briefly.	BT-5	Evaluate
2.	Explain the seismic waves with neat sketch.	BT-2	Understand
3.	Explain in detail about the plate tectonic theory and lithospheric plates.	BT-2	Understand
4.	Classify the types of geological faults and explain it briefly.	BT-2	Understand
5.	Differentiate magnitude and intensity. How will you measure magnitude and intensity.Explain the methods briefly.	BT-4	Analyse
6.	Write down the characteristics of strong ground motion with	BT-3	Application

	neat graph.		
7.	How will you estimate the measurement of earthquakes using Seismograph and Seismogram. With neat sketches.	BT-5	Evaluate
8.	What are the major plates that cause seismicity? List out the causes of earthquake occurred by manmade sources and explain it briefly.	BT-2	Understand
9.	On what is the assignment of an earthquake magnitude based? Is magnitude the same as intensity? Explain	BT-2	Understand
10.	List out some of the recent earthquakes occurred and give information on some disastrous earthquakes.	BT-4	Analyse
11.	Define focus and epicenter of an earthquake. Name the kinds of body waves and explain it with neat sketch.	BT-2	Understand
12.	Analyze how the intensity is measured using MMI scale as per codal provisions.	BT-4	Analyse
13.	Write short notes on Tsunami and Spectral acceleration.	BT-3	Application
14.	Discuss about the internal structure of the earth.	BT-5	Evaluate
15.	Explain about the elastic rebound theory.	BT-5	Evaluate
16.	Explain about the classification of earthquake.	BT-5	Evaluate
17.	Describe in detail about the details of Modified Mercalli scale Intensity with respect to intensity numbers.	BT-4	Analyse

PART-C

Q.No	Questions	BT Level	Competence
1.	Explain in detail about tectonic earthquakes briefly. List some of the past earthquakes caused by plate tectonics.	BT-2	Understand
2.	Discuss the case study on anyone of the major earthquakes occurred in India.	BT-6	Create
3.	What are the typical characteristics on which an earthquake depends?	BT-2	Understand
4.	Explain in detail about the various types of seismic waves with neat sketches.	BT-4	Analyse
5.	Classify the different peak amplitude parameters for a earthquake ground motion.	BT-4	Analyse

UNIT IV - RESPONSE OF STRUCTURES TO EARTHQUAKE

Effect of earthquake on different type of structures – Behaviour of Reinforced Cement Concrete, Steel and Prestressed Concrete Structure under earthquake loading – Pinching effect – Bouchinger Effects – Evaluation of earthquake forces as per IS:1893 – 2002 - Response Spectra – Lessons learnt from past earthquakes.

PART- A

Q.No	Questions	BT Level	Competence
1	Define Soil liquefaction	BT-1	Remember
2	Define Peak acceleration and response spectrum.	BT-1	Remember
3	What is meant by re-entrant corners of irregular buildings.	BT-1	Remember
4	Define the term base shear & storey drift.	BT-1	Remember
5	List out the methods of dynamic analysis.	BT-1	Remember
6	Classify the types of irregularities found on RC buildings during earthquake.	BT-2	Understand
7	What the different direct and indirect effects of earthquakes.	BT-2	Understand
8	Identify the major damages occur in the RC structures during earthquake.	BT-3	Application
9	Summarize about peak ground acceleration (PGA).	BT-2	Understand
10	Explain the term Response reduction factor	BT-2	Understand
11	What is soft storey failure.	BT-1	Remember
12	Identify the causes of damage occurred during bhuj earthquake.	BT-3	Application
13	Discuss about P-Delta Effect.	BT-3	Application
14	Compare mass irregularities from plane irregularities.	BT-2	Understand
15	Analyse the concept of floating column.	BT-4	Analyse
16	Distinguish between rigid diaphragm and flexible diaphragm.	BT-4	Analyse
17	Brief explain Short Column damages in RC buildings.	BT-2	Understand
18	Explain some of the exterior wall damages during earthquake.	BT-2	Understand
19	Formulate the expression for time period as per codal provision IS 1893:2002.	BT-2	Understand
20	Discuss about the pounding effect in buildings.	BT-2	Understand
21	Explain Zero period acceleration	BT-2	Understand
22	Identify the different effects of liquefaction	BT-3	Application
23	Analyze the formulas to be used to find the load factor for plastic design of steel structures	BT-4	Analyse
24	Evaluate the damages due to seismic effects.	BT-2	Understand
25	Choose the properties of soil based on which its spring constant depends	BT-2	Understand

PART-B

Q.No	Questions	BT Level	Competence
1	Explain briefly the effect of earthquake on different types of structures.	BT-2	Understand
2	Illustrate about the vertical irregularities that affect the performance of RC buildings during earthquake.	BT-2	Understand

3	What is the concept of Peak acceleration and Design Spectrum describe it with neat sketches.	BT-1	Remember
4	Write the step by step dynamics analysis procedure of RC framed structure as per IS 1893:2002 with suitable assumed data of your choice.	BT-3	Application
5	Elaborate the planning and architectural considerations in RC buildings and also discuss the potential deficiencies of buildings exist in our society.	BT-4	Analyse
6	A four storey reinforced concrete frame building is situated at Chennai. The height between the floors is 3.5 m and total height of building is 14 m. The dead load and live load is lumped at respective floor ($M_1= 3000\text{kN}$, $M_2 =3000 \text{ kN}$, $M_3= 3000\text{kN}$ $M_4= 2500\text{kN}$. The soil below the foundation is assumed to be hard rock. Assume building is intended to be used as a hospital. Determine the total base shear distributed lateral force as per IS1893 (PART 1): 2002.	BT-4	Analyse
7	Analyse a special reinforced concrete moment resisting frame building with infill panels is situated in delhi. Height of the building is 12m. The building is resting on medium soil. The base dimensions of building at plinth level is 24m. determine the design horizontal seismic coefficient and vertical seismic coefficient for damping of 2%	BT-4	Analyse
8	List out the effects and methods to reduce soil liquefaction in brief.	BT-1	Remember
9	Explain in detail about the methods of seismic analysis.	BT-2	Understand
10	Define Response spectra. Explain the concept and types of response spectra with neat sketch.	BT-1	Remember
11	A three storeyed symmetrical RC school building situated at Bhuj with following data: Plan dimension : 7 m Storey height : 3.5 m Total weight of beams in a storey : 130 kN Total weight of slab in a storey : 250 kN Total weight of columns in a storey : 50 kN Total weight of walls in a storey : 530 kN Live load : 130 kN Weight of terrace floor : 655 kN The structure is resting on hand rock. Determine the total base shear and lateral loads at each floor level for 5% of damping using seismic coefficient method.	BT-5	Evaluate
12	List out the step by step procedure to analyze a frame by equivalent static lateral load method.	BT-2	Understand
13	Solve the design lateral forces at each floor level for a two storey RC shear frame of a hospital building for the following data. Use response spectrum method of IS1893-2002. Seismic weight of each floor = 50kN Spacing between columns = 3m c/c	BT-3	Application

	<p>Height of each floor = 3m Type of structure = SMRF Location of the building = Coimbatore Type of soil = Rock Combined stiffness of ground floor columns = 2000kN/m Combined stiffness of first floor columns = 1000 kN/m</p>		
14	<p>A four storey reinforced concrete frame building as shown in fig: is situated at Roorkee. The height between the floors is 3 m and total height of building is 12 m. The dead load and live load is lumped at respective floor. The soil below the foundation is assumed to be hard rock. Assume building is intended to be used as a hospital. Determine the total base shear as per IS1893 (PART1): 2002. Solve and distribute the base shear along the height of the building=3m(each storey).Take $m_1=3000$, $m_2=3000$, $m_3=3000$, $m_4=2500$.</p>	BT-3	Application
15	<p>Explain the behaviour of Reinforced Cement Concrete and Prestressed Concrete Structures under earthquake loading.</p>	BT-3	Application
16	<p>Consider a SDOF system with mass $m=2 \times 10^3$ kg, stiffness $k=60$ kN/m and damping $C=0.44$ kN sec/m. Using the response spectra of EI centro, 1940 earthquake compute Maximum relative displacement and Maximum strain energy.</p>	BT-3	Application
17	<p>Explain the Cyclic behaviour of Concrete and Reinforcement Bauschinger and Pinching effects.</p>	BT-3	Application
PART-C			
Q.No	Questions	BT Level	Competence
1.	Identify the seismic damages during Bhuj earthquake.	BT-3	Application
2.	Explain any one code based procedure for seismic analysis.	BT-2	Understand
3.	Analyze the factors affecting response spectra.	BT-4	Analyse
4.	With a help of a case study, Explain briefly the lessons learnt from a recent earthquake happened in India after the year 2004.	BT-6	Create
5.	Explain concept of Peak acceleration and Design Spectrum with neat sketches.	BT-2	Understand

UNIT V - DESIGN METHODOLOGY

Causes of damage – Planning considerations / Architectural concepts as per IS:4326 – 1993 – Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings – Lateral load analysis – Design and detailing as per IS:13920 – 1993.

PART –A

Q.No	Questions	BT Level	Competence
1	Define the following terms Rotational Ductility and Curvature Ductility	BT-1	Remember
2	Define the terms DBE, MCE and MMI.	BT-1	Remember
3	Define diaphragm discontinuity.	BT-1	Remember
4	List out the factors affecting ductility.	BT-2	Understand
5	Define ductility ratio.	BT-1	Remember
6	Identify the methods of improving element level Ductility.	BT-3	Application
7	Explain the Structural plan density.	BT-2	Understand
8	Explain two cases of design horizontal earthquake load.	BT-2	Understand
9	Identify the importance of ductility in RC structures.	BT-3	Application
10	Examine the design considerations made in masonry structures.	BT-4	Analyse
11	Illustrate any two provisions for flexural members given in the code IS13920.	BT-2	Understand
12	Write a short note Special confining reinforcement.	BT-3	Application
13	What are the methods available for lateral load analysis of rigidly jointed frames	BT-1	Remember
14	Classify the types of damages occur in masonry building during earthquakes.	BT-2	Understand
15	Distinguish between Weak Storey and Soft Storey.	BT-4	Analyse
16	List the planning considerations made as per IS 4326:1993 for masonry building.	BT-4	Analyse
17	How will you assess the causes of damage in RC and Masonry buildings?	BT-3	Application
18	What do you mean by Lateral load analysis?	BT-1	Remember
19	Elaborate the four techniques that mainly contributes to aseismic design of earthquake resistant building.	BT-3	Application
20	Discuss about the strong column-weak beam design concept.	BT-2	Understand
21	What do you know about Displacement Ductility	BT-2	Understand
22	Identify the steps involved in the lateral load analysis of masonry building.	BT-3	Application
23	Analyse the reason for high casualty during earthquake	BT-4	Analyse
24	Evaluate the causes of damages due to earthquake	BT-2	Understand
25	Formulate the steps to improve global level ductility	BT-1	Remember

PART-B

Q.No	Questions	BT Level	Competence
1	List out the codal provisions for architectural considerations and structural design considerations as per IS 4326:1993.	BT-4	Analyse
2	Elaborate the design principles involved in design of masonry	BT-5	Evaluate

	structure.		
3	Explain the methods to improve local and global level ductility.	BT-3	Application
4	Explain the principles and practice of earthquake resistant design of R.C.C buildings.	BT-3	Application
5	Classify the damages and non-damages occurred in masonry buildings during an earthquake with examples.	BT-2	Understand
6	Identify the different methods adopted in introducing ductility into RC structures.	BT-3	Application
7	List the design steps involved in Equivalent static force analysis (Lateral Load Analysis)	BT-4	Analyse
8	What is the effect of ignoring the contribution of masonry infill in the lateral load analysis of a multi-storey frame?	BT-3	Application
9	Compare and contrast earthquake design of masonry and RC structures.	BT-5	Evaluate
10	Explain the factors affecting ductility. Describe the importance of ductility in earthquake resistant design.	BT-2	Understand
11	Why ductility consideration is very important in earthquake resistant design of RC building? Explain the ductile detailing considerations in flexural members as per IS 13920-1993.	BT-2	Understand
12	Analyse the causes of damages occurred in RC building during earthquake.	BT-4	Analyse
13	List out the design principles of earthquake resistant structure as per IS 1893-2002.	BT-2	Understand
14	Explain the concept of base Isolation Techniques.	BT-2	Understand
15	Write the guidelines for Earthquake Resistant Design Philosophy.	BT-3	Application
16	Write down the various earthquake resistant features that can be introduced in masonry buildings to make it earthquake resistant.	BT-3	Application
17	Explain the direct and indirect seismic effect on structures.	BT-2	Understand
PART-C			
Q.No	Questions	BT Level	Competence
1.	Why and where special confining reinforcement is required in an earthquake resistant building? Explain in detail.	BT-5	Evaluate
2.	Write the Planning considerations for Earthquake resistant design in detail.	BT-6	Create
3.	Classify the different types of shear wall with neat sketches	BT-4	Analyse
4.	Write short note on type of damper with neat sketch?	BT-5	Evaluate
5.	Explain in detail the two methods of dynamics analysis for lateral loads.	BT-4	Analyse